

# EXHIBIT 10

IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF CALIFORNIA  
SAN FRANCISCO DIVISION

ORACLE AMERICA, INC., )  
Plaintiff, )  
v. ) Civ. A. No. 10-03561 WHA  
GOOGLE INC., ) (Jury)  
Defendant. )

**REPLY EXPERT REPORT OF PROFESSOR ADAM JAFFE, Ph.D.**

**FEBRUARY 29, 2016**

1) Original Purpose and Summary of the Kim Analysis

75. Kim's unpublished thesis has two chapters. Dr. Leonard focuses on the second chapter of the analysis, which attempts to measure the contribution of applications to hardware/platform sales of iOS and Android in the 2010 to 2012 timeframe. Kim finds that applications are heterogeneous in terms of quality and user appeal, and that users on each platform have different preferences for application usage. Kim also finds that iPhone users have higher demand for applications than Android users, and Android sales mainly came from advantages in price-adjusted quality of hardware.<sup>118</sup> These findings are not, however, instructive to the exercise of determining outcomes in a non-Android world (or non-Java-based Android), or a world in which the entry dynamics of Android and likelihood of success are changed dramatically.

76. Before proceeding further, it is useful to discuss the methodology in Kim (2013). The Kim model is a "static" nested logit discrete choice model of demand for smartphones. This means that consumers do not anticipate the future when making decisions, nor consider past purchases when deciding what to buy in any period.<sup>119</sup>

77. More specifically, the first key assumption of Kim's model is that consumers in each month can decide to purchase one smartphone from those that are currently available, and "only consider the possibility of apps currently available."<sup>120</sup> This implies that consumers do not anticipate any changes to the set of products that are available (e.g., new phones), the possibility of new applications that will be released, or that prices may potentially fall (among many other things). Further, this also implies that a consumer only considers the utility that she will obtain in the first month of using a phone when deciding whether or not to pay the full purchase price. Additionally, this first key premise implies there are no restrictions on the number of phones that a consumer can purchase, and factors such as recently having purchased a phone or having certain experiences with given devices do not impact consumer's purchase decisions.<sup>121</sup>

78. When constructing a measure of the utility that consumers obtain from applications, Kim again assumes that consumers consider only applications that are currently available, and do not believe that any

<sup>118</sup> See generally, M.J. Kim, *Essays on the Economics of the Smartphone and Application Industry*, University of Minnesota (2013).

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<sup>120</sup> M.J. Kim, *Essays on the Economics of the Smartphone and Application Industry*, University of Minnesota (2013), p. 34.

<sup>121</sup> M.J. Kim, *Essays on the Economics of the Smartphone and Application Industry*, University of Minnesota (2013), p. 34.

additional applications will ever be released in the future. Further, Kim again assumes that consumers purchase applications only within the first month of smartphone ownership (and do not purchase any more applications in subsequent months). Kim's utility measure assumes consumers view applications as independent products, and do not treat any as substitutable (which implies that the 100<sup>th</sup> identical copy of a solitaire game is just as valuable as the 1<sup>st</sup> copy). Finally, the utility measure assumes that the actual sales of an application can be perfectly measured from observing its rank in an App Store top application list.

79. These sets of assumptions are questionable, and unlikely to be reasonable in the smartphone and application market. Nevertheless, Leonard uses Kim's estimates, which are derived from and therefor rely on these assumptions, in order to quantify what might have happened to Android sales had fewer applications been available on Android.

## 2) Kim's Estimates are Not Valid for this Analysis

80. There are several reasons why Kim's estimates are ill-suited for this analysis. First, her estimates rely on (imperfectly measured) data from a time period following the establishment of Android as a viable platform (February 2010 to December 2011), and not during the period of its launch, in which its success was uncertain. Kim, herself, noted that her model would be expected to change for estimating the time period before 2010.<sup>122</sup> Thus, even if her parameters were accurately estimated, they would not be appropriate for analyzing the period in question.

81. Second, the Kim model is a fundamentally static analysis of an inherently dynamic process. As is well known in the economics literature, estimating a static model of demand for a good that is inherently durable, such as a smartphone, will yield biased (i.e., incorrect) measures of consumer responsiveness to various product characteristics, including price and product attributes.<sup>123</sup> This concern is exacerbated in an inherently dynamic networked market such as the smartphone and application industry. As discussed in many peer-reviewed economic papers, failing to account for the fact that consumers are forward looking

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<sup>122</sup> M.J. Kim, *Essays on the Economics of the Smartphone and Application Industry*, University of Minnesota (2013), p. 44 (Kim "expect[s] that the portion of the log-odds ratio explained by the app benefits was higher before 2010").

<sup>123</sup> Aguirregabiria, Victor and Aviv Nevo, "Recent Developments in Empirical IO: Dynamic Demand and Dynamic Games," Advances in Economics and Econometrics: Theory and Applications: Tenth World Congress, 2013.